

# **METHOD AND SYSTEM FOR DISPLAY OF ELECTRONIC MAIL**

## **FIELD OF THE INVENTION**

The present invention relates generally to the field of information display, and  
5 in particular, to the display of electronic mail collections.

## **BACKGROUND OF THE INVENTION**

There are many circumstances in which people have to inspect the content of  
large e-mail folders. These folders may be personal inboxes in which large amounts  
of mail have accumulated, personal folders to which many messages have been  
10 routed, or archives of public or private discussion lists. For personal folders, a user  
may intend to sort messages into those to be discarded and those to be subjected to  
deeper examination or action. For mailing list archives, a user's purpose may be to  
understand the general concerns of the archive and to focus on those concerns, if any,  
that are relevant to the user. Such tasks are in contrast to focused searches for  
15 particular kinds of information.

Folder examinations are facilitated to some extent by contemporary mailers by  
providing high-level outline listings, with progressive disclosure that allows  
expansion of categories or subject items to listings of individual messages within a  
selected group. Further, these contemporary mailers may include a presentation that  
20 can descend to the message-list level where the first few lines of the individual  
messages may sometimes be included in the listings. However, such lines may be of  
limited utility because they often consist of a greeting followed by a quoted excerpt  
from a previous message. Thus, such mailers may repetitively display excerpts from  
the same message.

## **SUMMARY OF THE INVENTION**

The method and apparatus of the present invention is directed to a multi-level,  
text-embedded display of electronic mail collections that provides a sequence of  
increasingly detailed presentation levels. The less detailed levels assist a user in  
deciding whether a thread may be of interest. The more detailed levels allow a further  
30 inspection of thread content. At all levels, threads may also be presented in such a  
way as to maintain ongoing awareness of the thread context of each message.

In one embodiment of the present invention the sequence begins at an overall collection level. This overall collection level lists threads, optionally together with an initial fragment of the initial message of each thread. The initial fragments are formed from the initial substantive lines, rather than the initial literal lines. Threads of the corpus may be listed in time-based, last-to-first or first-to-last orders, or in order of thread size, from longest to shortest, to obtain a good idea of which subjects are of most interest or importance to the archive contributors.

A thread of interest may then be viewed as a single document at one of at least five levels. The first level is an outline of the thread. The second level lists the messages of the threads together with the initial substantive fragments. The third level lists the messages of the thread together with the message content in a compressed text form that is described in patent application entitled METHOD AND APPARATUS FOR PRESENTING E-MAIL THREADS AS SEMI-CONNECTED TEXT BY REMOVING REDUNDANT MATERIAL, Serial No. (Attorney Docket 001508-003190), filed concurrently herewith, and the disclosure of which is totally incorporated herein by reference. A fourth level lists the messages of the thread together with the message content abbreviated, for lengthy postings, using an e-mail adapted summarization technique to abbreviate lengthy postings. A fifth level of presentation synthesizes briefer forms, for example, thread outlines with or without embedded substantive fragments and longer forms, for example, thread listings embedding compressed-text or summary forms, each form in interacting frames to facilitate navigation and to maintain thread context throughout the reading of long threads.

#### BRIEF DESCRIPTION OF THE DRAWINGS

Embodiments of this invention will be described in detail, with reference to the following figures:

FIG. 1 is a block diagram of a computer controlled display system in accordance with an embodiment of the present invention;

FIG. 2 shows a display of an outline of a section of a discussion list including embedded substantive initial fragments of initial messages of threads in accordance with an embodiment of the present invention;

FIG. 3 shows a display of a portion of one of the threads from the discussion list shown in FIG. 2, with embedded substantive fragments for each message in accordance with an embodiment of the present invention;

FIG. 4 shows a display of a summary form of a lengthy text message in accordance with an embodiment of the present invention;

FIG. 5 shows a display of a compressed text form of the same lengthy message that is summarized in FIG. 4 in accordance with an embodiment of the present invention;

FIG. 6 shows a first display of a fifth level presentation in accordance with the present invention;

FIG. 7 shows a second display of a fifth level presentation in accordance with the present invention; and

FIGS. 8 and 9 show a flowchart outlining an embodiment of a control routine in accordance with the present invention.

#### DETAILED DESCRIPTION OF THE INVENTION

The computer based system on which an embodiment of the present invention may be implemented is described with reference to FIG. 1. Referring to FIG. 1, the computer based system includes a plurality of components coupled via a bus 101. The bus 101 may include a plurality of parallel buses (e.g. address, data and status buses) as well as a hierarchy of buses (e.g. a processor bus, a local bus and an I/O bus). The computer system further includes a processor 102 for executing instructions provided via bus 101 from internal memory 103 (note that the internal memory 103 is typically a combination of random access and read only memories). The processor 102 is used to perform various operations in support of creating the tree visualizations. Instructions for performing such operations are retrieved from internal memory 103. Such operations that would be performed by the processor 102 are described with reference to FIG. 6. The processor 102 and internal memory 103 may be discrete components or a single integrated device such as an application specification integrated circuit (ASIC) chip.

Also coupled to the bus 101 are a keyboard 104 for entering alphanumeric input, external storage 105 for storing data, a cursor control device 106 for

manipulating a cursor, and a display 107 for displaying visual output. The keyboard 104 would typically be a standard QWERTY keyboard but may also be telephone like keypad. The external storage 105 may be fixed or removable magnetic or optical disk drive. The cursor control device 106, e.g. a mouse or trackball, typically has a button or switch associated with it to which the performance of certain functions can be programmed.

An embodiment of the present invention operates using two processes. The first process forms several types of message abbreviations. The second process involves placing the abbreviations in a collection viewing cascade. A collection viewing cascade is a collection of available views in which each have a different method of displaying a collection of threads, and of individual threads. Each view in the cascade offers a different degree of detail for the displayed item(s).

The first process, of forming message abbreviations, may be performed using the analysis aspect of the method and apparatus described in patent application entitled METHOD AND APPARATUS FOR PRESENTING E-MAIL THREADS AS SEMI-CONNECTED TEXT BY REMOVING REDUNDANT MATERIAL. The process described in that co-pending patent application provides a result with each message being decomposed into a tree or tree-equivalent such that each child node represents either a sequence of first-level material from its parent, or an excerpt of another message. The first-level children, which represent the non-quoted material of the message, are further decomposed into block types. Block types include prose paragraph blocks, blocks representing tables, sample program code and other types of line oriented material, signature material blocks and the like.

One embodiment of the present invention obtains substantive message fragments by extracting the first fixed-length initial sequence following any excerpt and/or excerpt-introduction material, with that sequence prefixed by a quote indicator if the first physical material is an excerpt. This simultaneously avoids using the fragment space to repeat text of a previous message and, at the same time, indicates the response in the original text.

Compressed text forms are developed from the analysis results using the method and apparatus described in patent application entitled METHOD AND APPARATUS FOR PRESENTING E-MAIL THREADS AS SEMI-CONNECTED

TEXT BY REMOVING REDUNDANT MATERIAL, in which, the message representation consists of the non-extraneous parts of the primary text, interspersed with abbreviated, attributed top-level quotes.

Message summaries may also be developed from the analysis results. It is anticipated that summaries will be used for relatively lengthy messages. E-mail adapted summaries in accordance with the present invention differ from conventional text summaries in at least two ways. First, the e-mail adapted summaries of the present invention carefully preserve the overall structure of the messages and abbreviate only within blocks or sequence of blocks of like type and also carefully indicate where material has been deleted. Second, the e-mail adapted summarization methods are different for different types of blocks. For example, sequences of one or more prose paragraphs may be concatenated and submitted to an existing summarizer to identify the most salient sentences in a block. Then the selected sentences may be aligned with the original sentences to determine where to insert elision indicators. This procedure may be selected such that it may be automatically provided when connected paragraphs exceed a pre-determined size. For blocks representing line-oriented text, such blocks are elided by including only a pre-specified number of lines followed by elision indicators.

The embodiment of the present invention will then provide a completed message summary from the abbreviated blocks by concatenating the individual abbreviated components, together with abbreviated quoted excerpts in order of appearance in the original message. Additionally, signature and contact material may be omitted entirely.

After the individual messages are processed, the collection viewing cascade is developed. Such development may take place statically or dynamically. At the top level, threads of the collection are listed together with an initial fragment of the first message in the thread along with a prefix of the name of the author as shown in FIG. 2. Items that represent single message threads are linked directly to the associated messages. Other items are linked to individual thread displays. FIG. 2 shows a display 200 with threads 202 listed with initial fragments 204 of the first message in each thread in a first column. The display 200 also includes a second column that shows the number of messages 206 in each thread and a third column that shows the

range of dates 208 over which the messages in each thread were received. The display 200 also has a link 210 for each thread, through which a user may obtain a presentation of the corresponding thread.

If a user selects a thread for viewing, the present invention provides at least five alternative views for displaying the threads in increasing levels of detail. Each level of detail uses a semi-linear thread-representation form obtained by a technique described in patent application entitled METHOD AND SYSTEM FOR PRESENTING SEMILINEAR HIERARCHY DISPLAYS, Serial No. (Attorney Docket 001508-003200), filed concurrently herewith, and the disclosure of which is totally incorporated herein by reference.

The first thread viewing level provides a simple outline. This viewing level provides a general idea of the structure of long threads. A second viewing level includes a display of initial substantive fragments of each message. A display in accordance with the second viewing level is shown in FIG. 3. FIG. 3 shows a display 300 with a thread that includes initial substantive fragments 302 for each message in the thread. Each message also includes a header that includes the message number 304, a link to the underlying message 306 and the date and time of receipt of the message, 308.

The third viewing level, which provides the most detailed view, embeds into the semi-linear form a compressed text form for each message, using the technique described in patent application entitled METHOD AND APPARATUS FOR PRESENTING E-MAIL THREADS AS SEMI-CONNECTED TEXT BY REMOVING REDUNDANT MATERIAL. An example of such a compressed form is shown in FIG. 5.

A fourth viewing level may provide embedded e-mail-adapted summaries for each message when the compressed text form is sufficiently long to warrant an abbreviation. An example of such a summary is shown in FIG. 4. In all of the views, the message indicators are linked to the corresponding messages.

Such a viewing cascade sequence enables a user to determine which parts of the collection that they would like to inspect and to inspect only those parts at the level of detail which is appropriate to their current task.

A fifth viewing level, examples of which are shown in FIGS. 6 and 7, is tailored for the detailed study of threads containing generally very long messages. Interacting frames are used to allow users to maintain an awareness of the thread context of the message being read, and to easily navigate through elements of the thread. The left-hand frame is used for context-related functions, and the right-hand frame provides the semi-linear form thread display with embedded compressed-text messages.

FIG. 6 shows a first display 600 of a thread using this fifth viewing level in accordance with an embodiment of the present invention. Here the left hand frame 602 contains the thread outline 604. It is also to be understood that the left hand frame may also contain initial fragments as shown in FIG. 3. Selecting a particular message on the left-hand frame scrolls the compressed-text form of the thread such that the selected message appears within the right hand frame 608.

FIG. 7 illustrates a second display 700 of the thread of FIG. 6 using the fifth viewing level. In the right hand frame 702 a compressed-text message 704 has been scrolled into view. It allows a user to request that a view of the predecessor 708 of the message 704 be placed in the left hand frame 706. In this manner, the predecessor 708 may be kept in view as the right hand frame 702 is scrolled through its successors. The predecessor 708 may also be revisited after a long response chain associated with a successor 704. At any time, the left hand side outline form 604 shown in FIG. 6 may be restored.

FIGS. 8 and 9 show a flowchart outlining an control routine in accordance with one embodiment of the present invention. Upon a request for a display of a corpus, the control routine starts at S800 and continues to S802. In S802, the control routine determines whether a new, non-previously processed messages have entered the corpus. If, in S802, the control routine determines that there are no new messages, then the control routine jumps to S908. If, however, in S802, the control routine determines there are new messages, then the control routine continues to S804. In S804, the control routine selects the first message in the thread and continues to S806. In S806, the control routine finds the substantive fragment for the corpus and continues to S808. In S808, the control routine forms a compressed text representation of the message and continues to S810. In S810, the control routine

develops inter-quote summary blocks and continues to S812. In S812, the control routine generates a complete message summary by interspersing quotes or abbreviated quotes with inter-quote summaries and continues to S814. In S814, the control routine links the message into the appropriate thread and continues to S816. In S816, the control routine determines if there is another message in the thread. If, in S816, the control routine determines that there is another new message thread, then the control routine returns to S804. If, however, in S816, the control routine determines that no other message remains to be processed, then the control routine continues to S900.

In S900, the control routine selects the first new or modified thread and continues to S902. In S902, the control routine develops the semi-linear structure and continues to S904. In S904, the control routine develops alternative-length thread representations by inserting message fragments, compressed text, or message summaries within the semi-linear structure and continues to S906. In S906, the control routine determines if another thread in the corpus requires processing. If, in S906, the control routine determines that another thread in the corpus requires processing, then the control routine returns to S900. If, however, in S906, the control routine determines that no other thread in the corpus requires processing, then the control routine continues to S908.

In S908, the control routine prepares to display the corpus in the requested sort order by selecting the first thread in the current order and continues to S910. In S910, the control routine determines whether the current thread is a single message thread. If, in S910, the control routine determines that the current thread is a single message thread, then the control routine continues to S916. In S916, the control routine generates a link to the associated message and continues to S918. If, however, in S910, the control routine determines that the current thread is not a single message thread, then the control routine continues to S912. In S912, the control routine generates a link to the individual thread display and continues to S914. In S914, the control routine determines if another thread remains in the corpus. If, in S914, the control routine determines that another thread remains in the corpus, then the control routine returns to S908. If, however, in S914, the control routine determines that another thread does not exist in the corpus, then the control routine continues to S918.



In S918, the control routine displays the corpus, presenting, for example, the thread subject for each thread, the substantive initial fragment, the selected link and the like and continues to S920. In S920, the control routine returns control of the display apparatus to the control routine that called the control routine of FIGS. 8 and 9.

5 As illustrated in FIG. 1, the computer controlled display system is implemented either on a single program general purpose computer, or separate program general purpose computer. However, the computer controlled display system can also be implemented on a special purpose computer, a programmed  
10 microprocessor or microcontroller and peripheral integrated circuit element, an ASIC or other integrated circuit, a digital signal processor, a hard wired electronic or logic circuit such as a discrete element circuit, a programmable logic device such as a PLD, PLA, FPGA, PAL, or the like. In general, any device capable of implementing a finite state machine that is in turn capable of implementing the flowchart illustrated in FIGS. 8 and 9 can be used to implement the computer controlled display system  
15 according to this invention.

Furthermore, the disclosed method may be readily implemented in software using object or object-oriented software development environments that provide portable source code that can be used on a variety of computer or workstation hardware platforms. Alternatively, the disclosed computer controlled display system  
20 may be implemented partially or fully in hardware using standard logic circuits or VLSI design. Whether software or hardware is used to implement the systems in accordance with this invention is dependent on the speed and/or efficiency requirements of the system, the particular function, and the particular software or hardware systems or microprocessor or microcomputer systems being utilized. The  
25 computer controlled display systems and methods described above, however, can be readily implemented in hardware and/or software using any known or later-developed systems or structures, devices and/or software by those skilled in the applicable art without undue experimentation from the functional description provided herein together with a general knowledge of the computer arts.

30 Moreover, the disclosed methods may be readily implemented as software executed on a programmed general purpose computer, a special purpose computer, a microprocessor, or the like. In this instance, the methods and systems of this invention

can be implemented as a routine embedded on a personal computer such as a Java® or CGI script, as a resource residing on a server or graphics workstation, as a routine embedded in a dedicated electronic message management system, a web browser, an electronic message enabled cellular phone, a PDA, a dedicated computer controlled display system, or the like. The computer controlled display system can also be implemented by physically incorporating the system and method into a software and/or hardware system, such as the hardware and software systems of a dedicated computer controlled display system.

It is, therefore, apparent that there has been provided, in accordance with the present invention, systems and methods for computer controlled display. While this invention has been described in conjunction with embodiments thereof, it is evident that many alternatives, modifications and variations be apparent to those skilled in the applicable arts. Accordingly, Applicants intend to embrace all such alternatives, modifications and variations that follow within the spirit and scope of this invention.